Jurnal Pemberdayaan Masyarakat
Volume 4 Nomor 1 Tahun 2025 | Hal. 48 – 54
ykgm.org

ISSN 2962-8091
DOI: 10.46843/jmp.v4i1.349

Training of Making Ecoenzymes for the Cipanas Village Community as Waste Management Innovation

Leny Heliawati[1]*, Prasetyorini[2], Surti Kurniasih[3], Rita Retnowati[4], Putri Nabila Adinda Adriansyah[5]
[1,2,3,4]Master Program Science Education, Graduate School, Universitas Pakuan, Indonesia
[5]Agricultural Product Technology, Faculty of Engineering, Universitas Nusa Bangsa, Indonesia

ABSTRACT

Cipanas Village is classified as densely populated without landfills or institutions in charge of processing waste. This village accumulates mostly household organic waste in the form of vegetables, fruit, or other organic waste. To overcome the waste problem in this village, the community service team conducted socialization and demonstrations in making ecoenzymes to overcome organic waste problems. The ecoenzyme solution has many benefits, such as a cleaning solution, plant fertilizer, and many more. This community service activity consists of two stages: socialization and demonstration. This community service activity was very well received by the Cipanas Village community, as seen by the enthusiasm and many questions asked by the participants about the socialization and demonstration of making ecoenzymes. Community service activities like this are hoped to be carried out sustainably, encouraging people to be creative and innovative in creating a clean and waste-free environment while making products of ecoenzymes that are very beneficial for people's lives.

ARTICLE INFORMATION

Keywords:
cipanas village; eco- enzyme; garbage

Correspondent Author:
Leny Heliawati
Email:
leny_heliawati@unpak.ac.id

Saran Pengutipan: Heliawati, l., Prasetyorini., Kurniasih, S., Retnowati, R., Adriyansyah, P. N. A. (2025) Ecoenzyme Making Training for the Community in Cipanas Village as a Waste Management Innovation. *Jurnal Pemberdayaan Masyarakat, 4*(1), 48-54.

INTRODUCTION

Cipanas Village is located in Cipanas District, Cianjur Regency, West Java, approximately 40 kilometers from Universitas Pakuan. This urban village is classified as densely populated, with 16,788 people (Statistik, 2023). Based on its population density, this village accumulates much waste, mostly household organic waste in the form of vegetables, fruit, or other organic waste. The accumulation of waste in this village is due to the absence of landfills or institutions in charge of processing waste, which requires the local community's awareness of how to process their waste independently. Most people in this village work as farmers and homemakers. They produce organic waste daily, causing a continuous accumulation of waste that causes odors and environmental pollution (Rabbani et al., 2022).

Indonesia is one of the ten countries with the highest population worldwide (Nizmi et al., 2023). A high population does not rule out the possibility of causing further problems, including waste disposal and production (Perkasa et al., 2021). According to the Ministry of Environment and Forestry, national waste reached 17.4 tons in 2023, of which 33.5% has not been appropriately managed (Mustopa & Sulistiyorini, 2022). Waste accumulation has many adverse effects because it dramatically affects environmental quality, such as a decrease in water quality, causing people living in the surrounding area to experience a decrease in health and affecting the aesthetics of the surrounding environment (Walalangi et al., 2023). Law No. 18 of 2008 concerning waste management describes waste as solid or semi-solid waste from daily activities or natural organic and inorganic processes, which can be decomposed or cannot be decomposed and disposed of into the environment (Muliadi et al., 2022). Waste is divided into organic and inorganic (Rasidi et al., 2022). Organic waste comes

from living things, humans, animals, and plants, and decomposes naturally without human intervention (Pranata et al., 2021). Organic waste is easily decomposed and has a high water content (Shitophyta et al., 2021). In contrast, inorganic waste cannot be reused and is difficult to decompose by bacteria (Batubara et al., 2022), so it takes a long time up to hundreds of years to decompose plastic bottles, bags, cans, and the like, which are made of glass, cloth, and paper (Harimurti et al., 2020).

Various factors complicate the waste problem. One of the most significant problems related to waste in Indonesia is the level of public awareness and the way they use waste (Sholihah & Hariyanto, 2020). Therefore, comprehensive and continuous waste management must be done to reduce and deal with waste problems (Zuraidah et al., 2022). The 3R (Reuse, Reduce, and Recycle) is the best environmental conservation program and waste management method because it prioritizes waste management directly from the source (Ristya, 2020). The problem, especially organic waste, can be resolved by processing organic waste on the spot, creating a healthy, clean, and comfortable environment (Fajrona et al., 2023).

Most Indonesians cannot sort their waste in an integrated manner (Chaerul & Zatadini, 2020). If some people know how to sort their waste independently at home, sometimes it is not handled separately when it reaches the landfill. According to Nurfajriah et al. (2021), this happens in most landfills in Indonesia. Rahmawati et al. (2020) suggest that waste management requires sophisticated technology and environmentally conscious behavior to preserve the environment, especially concerning household or organic waste. Waste reprocessing, especially for organic waste, can be done by making ecoenzymes (Putri et al., 2023). Ecoenzyme comes from two words, "eco" and "enzyme." The word "eco" means "environment," and "enzyme" means organic biocatalysts from living organisms in protoplasm, consisting of proteins or compounds bound to proteins (Rasit & Kuan, 2018). Initially, ecoenzymes were made to reduce household waste by converting it into reusable products (Mahali et al., 2022). Ecoenzyme is a mixture of organic waste, such as fruits and vegetables, processed through fermentation (Sari et al., 2021). Using ecoenzymes supports household organic waste with an environmentally friendly concept (Wuni & Husaini, 2021). According to Rochyani et al. (2020), ecoenzymes can neutralize environmental pollutants, control plant pests, and maintain a clean environment. Ecoenzyme can also be used as a vegetable pesticide and plant fertilizer because the macro-element content of ecoenzyme consists of potassium (K) 203 mg/L and phosphorus (P) 21.79 mg/L (Yuliandewi et al., 2016). With the 1:1000 ratio of ecoenzyme and water, ecoenzyme can be directly applied to the soil to fertilize plants and soil and be sprayed directly on plants affected by pests if used as a vegetable insecticide (Kriswantoro et al., 2022). The ecoenzyme is processed by adding brown sugar or molasses to water with microorganisms selected from various groups of fungi and bacteria such as *Lactobacillus*, *Asotobacter xylinum*, yeast fungi, and lactic acid. This process lasts about three months (Neupane & Khadka, 2019).

The awareness of the Cipanas Village community of the importance of environmental cleanliness and the potential for utilizing household waste in organic materials is increasing. Therefore, the community service team from the Science Education Study Program of Pakuan Postgraduate School and Nusa Bangsa University studied and provided innovations to overcome problems by training to make ecoenzyme as a multipurpose liquid. By making ecoenzymes, waste in Cipanas Village can be reduced by accelerating waste processing, especially organic waste, into more valuable products. This activity was also carried out so people could beneficially reuse the waste around them, especially household waste. This activity was carried out in two stages: the first stage was socialization, which involved delivering material about ecoenzyme, and the second stage was a demonstration of making ecoenzyme.

METHOD

Community service was conducted by a team from the Science Education Study Program of Pakuan Postgraduate School in Cipanas Village on August 9-10, 2024, with the mothers and fathers in Cipanas Village as the target participants. This activity used the participatory method in community empowerment. The participatory method used is environment scanning, an integral part of community empowerment through building independence with the strength of resources and products (Parmin et al., 2022). This community service activity consists of two stages. The first stage was socialization, which began with a pre-test to find out the community's initial knowledge and the delivering material in a PowerPoint by explaining what ecoenzyme is, why organic waste is processed into ecoenzyme, how to process it, and the benefits. The second stage was a demonstration of making ecoenzymes from organic materials in the form of vegetable and fruit waste prepared by the team, and it ended with a post-test.

The activity began with socialization and counseling by the community service team to the participants. On this occasion, the details of what and how ecoenzyme is made were explained in detail. The materials used in making ecoenzyme are easy to obtain and collect because they come from household organic waste, such as vegetables and fruit peels that have not been processed and are not rotten, soiled, moldy, oily, hard, or woody. This socialization also explained that ecoenzymes are made after the fermentation process of leftover vegetables and fruits with water and sugar, which can be brown sugar, palm sugar, or molasses in specific proportions. However, it is not recommended to use granulated sugar because of its low sucrose content, so it is less effective during fermentation (Nururrahmani et al., 2023). The water used varies, such as gallon water, drinking water from depots, tap water, rainwater, well water, and even air conditioner water. The containers for storing the ecoenzyme must have a wide-mouthed lid and be made of plastic. It should not be small-mouthed containers because they are prone to exploding, should not be metal because they rust easily, and should not be glass because they break easily. Before this counseling activity, the community service team conducted a pre-test to determine the community's initial knowledge about ecoenzymes and their environmental benefits.

The next activity was a demonstration or hands-on practice of making ecoenzymes. These materials are needed to make ecoenzymes: sugar, leftover fruit and/or vegetable scraps, and water in a ratio of 1 (kg/g): 3 (Kg/g): 10 (L/ml). A clean and dry container must be first prepared and filled with clean water in the amount of 10% (L). 1% sugar or molasses (Kg) and 3% leftover fruit and/or vegetable scraps (kg) are added to the container. Mix the ecoenzyme ingredients and try not to exceed 60% of the volume of the container. After that, the container must be tightly closed and labeled with the date of manufacture. The container must not exposed to direct sunlight and get good air circulation to reduce further contamination. The fermentation solution must be stored away from toilets, garbage cans, waste incinerators, and chemicals for three months. To release the gas, open the container lid in the first week.

Furthermore, after three months of storage, the ecoenzyme solution was checked to determine the condition. If the solution is clear brown with a fresh sour smell and a pH of 4, it is good and can be harvested. Under certain conditions, black or green mold can cause contamination and foul odor, so the ecoenzyme container should be repaired or checked for density and storage location. If the ecoenzyme solution is damaged, the container must be closed and dried for thirty minutes under the morning sun for two to three days. The solution should rechecked on the seventh day after drying. If a foul odor persists and black or green mold remains, add sugar to the solution at the initial rate and ferment it for one month. After three months or ninety days, the ecoenzyme is ready to harvest and must be stored in a tightly sealed container. With a pH of 4, the ecoenzyme solution is light yellowish-

brown and has a fresh sour aroma. After the demonstration, the community service team conducted a post-test to compare the community's knowledge before and after the activity.

RESULTS AND DISCUSSION

Socialization and training on making ecoenzyme in Cipanas village produced a clear brown solution of ecoenzyme with a fresh sour aroma and pH 4 (Figure 1). The result is successful because, according to Rusdianasari et al. (2021), the success rate of ecoenzyme is when the fermented material is brown and has a fresh, sweet, and sour aroma. Therefore, this solution can be used immediately or stored. There is no expiration date for the ecoenzyme solution if it is not contaminated, so it is important to store this solution in a cool place, not exposed to direct sunlight, and tightly closed. The finished ecoenzyme can be used directly by diluting it with water appropriately for the purpose.



Figure 1. Ecoenzyme Solution



Figure 2. Distributing Ecoenzyme Solution to the Community

This ecoenzyme solution was distributed to the community in Cipanas Village to be used as a natural cleaning tool, not only for the surrounding environment, such as floors or polluted water (Figure 2). However, it can also be used for personal hygiene and care because the ecoenzyme solution can be mixed into sanitary products, wound medicines, and many more. Ecoenzyme solution can also be used as fertilizer, especially for mothers in this village who have many plants in their homes. With this, the community in Cipanas village knows how to overcome the organic waste problem around them by producing valuable goods for themselves and the environment.

Table 1. *Pre-test*

Question	Answer	
	YES	NO
Have you ever heard of ecoenzymes?	5 people	18 people
Have you ever studied ecoenzymes?	3 people	20 people
Do you know the benefits of ecoenzymes?	3 people	20 people
Do you know how to make ecoenzymes?	3 people	20 people

Table 2. *Post-Test*

Question	Answer	
	YES	NO
Have you ever heard of ecoenzymes?	23 people	0 people
Have you ever studied ecoenzymes?	23 people	0 people
Do you know the benefits of ecoenzymes?	23 people	0 people
Do you know how to make ecoenzymes?	23 people	0 people

The community service team prepared a pre-test and post-test, which was filled out by 23 people who attended this activity. The pre-test results are in Table 1, where the knowledge and skills of the community regarding ecoenzymes were minimal before the activity was held. Less than 50% of the community did not know about the benefits of ecoenzyme and how to make it. However, after the socialization and demonstration of making ecoenzymes, the knowledge and skills of the community about ecoenzymes increased (Table 2).

The community service team from the Science Education Study Program of the Pakuan Postgraduate School provides solutions to solve these problems by training in making ecoenzymes. In addition to reducing and processing organic waste in this village, making ecoenzymes can be helpful in community activities. The ecoenzyme solution mixed with water can clean household appliances, such as glass plates, shampoo, or bath soap. In addition, ecoenzyme functions as a plant fertilizer by spraying it on plants that produce many fruits and flowers. In addition, the ecoenzyme solution can be used to repair clogged drains. The dregs produced from fermentation are used as organic matter to fertilize plants (Sari & Basmantra, 2023).

The pre-test results revealed that most people in this village do not know ecoenzymes. Of the 23 people who participated in this activity, only five had heard of ecoenzymes and less than that about the benefits and how to make them. This result is the basis that it is very necessary to hold this training activity so that people understand how to process the waste they produce every day so that it does not pollute the environment and does not interfere with the health and comfort of the people in the village. Providing material before the demonstration or direct practice of making ecoenzymes is necessary to provide a more basic understanding so that people understand the activity.

The demonstration of making ecoenzymes is carried out so that the community sees firsthand how the process is so that they can practice it themselves at home. The community service team also brought finished ecoenzyme products to illustrate the correct form of ecoenzyme to the community. In addition, this demonstration activity was followed by a post-test. From Table 2, the participants understand the benefits and the manufacturing process to become knowledgeable and provide initial provision in processing waste at home. The community service team also distributed ready-made ecoenzyme products to the community so that they could immediately use them and feel the benefits. When people know how to process their waste, they will be more likely to use it. A healthy, comfortable life depends on a clean environment (Saptenno et al., 2022).

CONCLUSION

This community service activity was very well received by the Cipanas Village community, as seen from the participants, who were enthusiastic about the socialization and demonstration of making ecoenzymes. The participants asked questions about the material provided, helped prepare materials, and carried out demonstrations of making ecoenzymes. Community service activities like this are hoped to be carried out sustainably, encouraging people to be creative and innovative in creating a clean and waste-free environment while making products of ecoenzymes that are very

beneficial for people's lives. With this activity, people in Cipanas village increasingly know the importance of protecting the environment to reduce its negative impact and process and utilize their waste.

REFERENCES

Batubara, R., Mardiansyah, R., & Sukma A. M. A. (2022). Pengadaan Tong Sampah Organik Dan Anorganik Dikelurahan Indro Kecamatan Kebomas Gresik. *DedikasiMU : Journal of Community Service*, *4*(1), 101.

Chaerul, M., & Zatadini, S. U. (2020). Perilaku Membuang Sampah Makanan dan Pengelolaan Sampah Makanan di Berbagai Negara: Review. *Jurnal Ilmu Lingkungan*, *18*(3), 455–466.

Fajrona, K., Ferawati, F., Suhartati, L., & Suharto, E. L. S. (2023). Sosialisasi dan Demonstrasi Pemberian Vitamin B Kompleks untuk Kambing di Peternakan Ashar Farm Kota Payakumbuh. *Warta Pengabdian Andalas*, *30*(3), 446-450.

Harimurti, S. M., Rahayu, E. D., Yuriandala, Y., Koeswandana, N. A., Sugiyanto, R. A. L., Perdana, M. P. G. P., Sari, A. W., Putri, N. A., Putri, L. T., & Sari, C. G. (2020). Pengolahan Sampah Anorganik: Pengabdian Masyarakat Mahasiswa pada Era Tatanan Kehidupan Baru. *Prosiding Konferensi Nasional Pengabdian Kepada Masyarakat Dan Corporate Social Responsibility (PKM-CSR)*, *3*, 565–572.

Kriswantoro, H., Nasser, G. A., Zairani, F. Y., Nisfuriah, L., Rompas, J. P., Dali, D., Hasani, B., Yulianto, D., & Sofian, A. (2022). Utilization of Eco-Enzyme from Household Organic Waste to Maintain Soil Fertility and Plant Pest Control. *Altifani Journal: International Journal of Community Engagement*, *3*(1), 7.

Mahali, J., Destriani, Wilhotama, W., Bobi, Septika, F., Safitri, D., & Rahayu, I. (2022). Pembuatan Eco Enzym Sebagai Upaya Pengelolaan Lingkungan di Daerah Pantai Panjang Bengkulu. *Setawar Abdimas*, *1*(2), 45–50.

Muliadi, M., Rukhayati, R., & Maisa, M. (2022). Sistem Pengelolaan Sampah Rumah Tangga Di Kecamatan Tawaeli. *Sambulu Gana: Jurnal Pengabdian Masyarakat*, *1*(2), 35–38.

Mustopa, B. A. B., & Sulistiyorini, D. (2022). Hubungan Antara Pengetahuan, Sikap, Ketersediaan Sarana dan Petugas Kebersihan Dengan Perilaku Masyarakat dalam Pengelolaan Sampah Plastik di Kecamatan Pancoran Mas Depok Tahun 2022. *Ruwa Jurai: Jurnal Kesehatan Lingkungan*, *16*(2), 85.

Neupane, K., & Khadka, R. (2019). Production of Garbage Enzyme from Different Fruit and Vegetable Wastes and Evaluation of its Enzymatic and Antimicrobial Efficacy. *Tribhuvan University Journal of Microbiology*, *6*(1), 113–118.

Nizmi, Y. E., Sarikusumaningtyas, W., Hasibuan, A. I. R. S., & Mandataris. (2023). Edukasi dan Sosialisasi Perubahan Perilaku Pada Peserta Didik Jenjang Pendidikan Sekolah Dasar Sebagai Upaya Strategi Penerapan Perilaku Nonfood Waste di Indonesia. *Madaniya*, *4*(3), 1238–1245.

Nurfajriah, N. N., Mariati, F. R. I., Waluyo, M. R., & Mahfud, H. (2021). Pelatihan Pembuatan Eco-Enzyme Sebagai Usaha Pengolahan Sampah Organik Pada Level Rumah Tangga. *Jurnal Ikra-Ith Abdimas*, *4*(3), 194–197.

Nururrahmani, A., Hibatulloh, M. R., Nabila, R. A., Kusnadi, & Djuarsa, P. (2023). Ekoenzim dari Berbagai Jenis Kulit Jeruk. *HIGIENE: Jurnal Kesehatan Lingkungan*, *9*(1), 30–35.

Parmin, P., Rusilowati, A., & Rahayu, E. F. (2022). Pemberdayaan Masyarakat Melalui Konservasi Tanaman Obat untuk Menunjang Penyediaan Bahan Baku Produksi Jamu Tradisional. *Jurnal Pemberdayaan Masyarakat*, *1*(1), 10–16.

Perkasa, D. H., Fathihani, F., & Apriani, A. (2021). Pemberdayaan masyarakat melalui pendirian bank sampah di kelurahan Tanjung Duren. *Andhara*, *1*(2), 19-27.

Pranata, L., Kurniawan, I., Indaryati, S., Rini, M. T., Suryani, K., & Yuniarti, E. (2021). Pelatihan Pengolahan Sampah Organik Dengan Metode Eco Enzym. *Indonesian Journal Of Community Service*, *1*(1), 171–179.

Putri, R. T. H., Aisa, A., Taubah, M., Arrokhman, R. Y., Abdillah, M. A., & Fitriyah, I. N. (2023). Sosialisasi dan Pelatihan Pemanfaatan Sampah Organik sebagai Pupuk Alami Eco-Enzyme di Desa Sidomulyo. *Pertanian: Jurnal Pengabdian Masyarakat*, *4*(1), 1–5.

Rabbani, A., Sabrina, A., Larasati, A., Kusnulyaningsih, D., & Handayani, Q. (2022). Pengelolaan Sampah Melalui Pendidikan Kesadaran Bersih Lingkungan Sebagai Strategi Mitigasi Bencana di Desa Seriwe. *Jurnal Pengabdian Magister Pendidikan IPA*, *5*(1), 51-57.

Rahmawati, R., Purwoko, R. Y., & Utomo, A. C. (2020). Analisis Penerapan Pembelajaran Berdiferensiasi di Sekolah Dasar Pada Mata pelajaran Matematika. *Jurnal Basicedu*, *5*(5), 3(2), 524–532.

Rasidi, A. I., Pasaribu, Y. A. H., Ziqri, A., & Adhinata, F. D. (2022). Klasifikasi Sampah Organik dan Non-Organik Menggunakan Convolutional Neural Network. *Jurnal Teknik Informatika Dan Sistem Informasi*, *8*(1), 142–149.

Rasit, N., & Kuan, O. C. (2018). Investigation on the Influence of Bio-catalytic Enzyme Produced from Fruit and Vegetable Waste on Palm Oil Mill Effluent. *IOP Conference Series: Earth and Environmental Science*, *140*(1).

Ristya, T. O. (2020). Penyuluhan Pengelolaan Sampah Dengan Konsep 3R Dalam Mengurangi Limbah Rumah Tangga. *Cakrawala: Jurnal Manajemen Pendidikan Islam Dan Studi Sosial*, *4*(2), 30–41.

Rochyani, N.-, Utpalasari, R. L., & Dahliana, I. (2020). Analisis Hasil Konversi Eco-Enzyme Menggunakan Nenas (Ananas comosus) dan Pepaya (Carica papaya L.). *Jurnal Redoks*, *5*(2), 135.

Rusdianasari., Syakdani, A., Zaman, M., Sari, F. F., Nasyta, N. P., & Amalia, R. (2021). Production of Disinfectant by Utilizing Eco-enzyme from Fruit Peels Waste. *International Journal of Research in Vocational Studies (IJRVOCAS)*, *1*(3), 01–07.

Saptenno, M. J., Saptenno, L. B., & Timisela, N. R. (2022). Faktor Yang Mempengaruhi Tingkat Kesadarana Masyarakat Pesisir Terhadap Pengelolaan Sampah di Perairan Teluk Ambon Kota Ambon. *Jurnal Ilmu Lingkungan*, *20*(2), 365–374.

Sari, P. T., & Basmantra, I. N. (2023). Pemanfaatan Sampah Organik Rumah Tangga Menjadi Eco Enzyme Dalam Upaya Pemberdayaan Ekonomi Masyarakat Desa Rejasa. *Vivabio*, *5*(2), 78–84.

Sari, V. I., Susi, N., & Rizal, M. (2021). Pelatihan Pemanfaatan Sampah Organik Sebagai Bahan Eco-Enzym Untuk Pembuatan Pupuk Cair, Desinfektan Dan Hand Sanitizer. *COMSEP: Jurnal Pengabdian Kepada Masyarakat*, *2*(3), 323–330.

Shitophyta, L. M., Amelia, S., & Jamilatun, S. (2021). Pelatihan Pembuatan Pupuk Kompos Dari Sampah Organik Di Ranting Muhammadiyah Tirtonirmolo, Kasihan, Yogyakarta. *Community Development Journal : Jurnal Pengabdian Masyarakat*, *2*(1), 136–140.

Sholihah, K. K. A., & Hariyanto, B. (2020). Kajian tentang pengelolaan sampah di Indonesia. *Swara Bhumi*, *3*(03), 1-9.

Statistik, B. P. 2023. (2023). *A XXXXX Dalam Angka 2023*.

Walalangi, J. Y., Ndobe, S., Mangitung, F., & Hasanah, N. (2023). Pengelolaan Sampah Laut Organik Dan Anorganik Bagi Masyarakat Pesisir Di Teluk Lalong Kota Luwuk. *Jurnal Cendekia Mengabdi Berinovasi Dan Berkarya*, *2*(1), 17.

Wuni, C. & Husaini, A. (2021). Pelatihan Pembuatan Eco-Enzyme Dari Limbah Organik Rumah Tangga Sebagai Alternatif Cairan Pembersih Alami. *J-ABDI: Jurnal Pengabdian Kepada Masyarakat*, *1*(4), 589–594.

Yuliandewi, N. W., I Made, S., & IGN., A. W. (2016). Utilization of Organic Garbage as "Eco Garbage Enzyme" for Lettuce Plant Growth (Lactuca Sativa L.). *International Journal of Science and Research (IJSR)*, *7*(2), 1521–1525.

Zuraidah, Z., Rosyidah, L. N., & Zulfi, R. F. (2022). Edukasi Pengelolaan dan Pemanfaatan Sampah Anorganik di MI Al Munir Desa Gadungan Kecamatan Puncu Kabupaten Kediri. *Budimas: Jurnal Pengabdian Masyarakat*, *4*(2), 1–6.